

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)	
)	
Revision of Part 15 of the Commission's Rules)	ET Docket 98-153
Regarding Ultra-Wideband Transmission)	
Systems)	

COMMENTS OF XTREMESPECTRUM, INC.

November 22, 2002

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XtremeSpectrum, Inc. files these Comments on the Commission's report: *Measured Emissions Data for Use in Evaluating the Ultra-Wideband (UWB) Emissions Limits in the Frequency Bands Used by the Global Positioning System (GPS)*, Project TRB 02-02 (October 22, 2002) (GPS Noise Report).¹

A. SUMMARY

XtremeSpectrum has always supported all reasonable measures needed to protect critical safety services, including GPS-driven E-911. In particular, XtremeSpectrum has consistently advocated low UWB emissions limits in the GPS bands, including the low values requested by the U.S. GPS Industry Council and based on a conservative NTIA analysis, as ultimately adopted by the Commission. We continue to believe that the rules in the First Report and Order applicable to indoor and hand-held devices should remain unchanged.²

Sprint Corporation requested reconsideration of the GPS-band limits on the theory that lower limits would improve the operation of indoor GPS-based E-911.

¹ XtremeSpectrum manufactures ultra-wideband communications systems as its sole business. It takes no position on ultra-wideband imaging applications.

² *Ultra-Wideband Transmission Systems*, 7 FCC Rcd 7435 (2002) (First Report and Order).

The GPS Noise Report now shows conclusively that Sprint is incorrect. Ambient indoor noise levels and emissions from commonplace office and household devices are much higher than UWB emissions limits in the GPS bands. These, not UWB, set the floor for indoor E-911 operation. Lowering the UWB limits would have no effect whatsoever on indoor E-911.

B. BACKGROUND

The First Report and Order in this proceeding accepted, at face value, NTIA's conservative requests for GPS protection.³ NTIA specified levels 6 dB below the noise floor, and assumed a UWB device 2 meters from the GPS receiver.⁴ These parameters yielded GPS-band emission limits for indoor and hand-held UWB devices of -75.3 dBm/MHz, or 34 dB below the general Part 15 limits⁵ -- within 1 dB of the value requested by the U.S. GPS Industry Council.⁶ Narrowband emissions at GPS frequencies are required to be 10 dB lower still.⁷ These are the quietest emissions levels specified for any device anywhere in the Commission's Rules.

³ First Report and Order at para. 183, Table 8.

⁴ GPS Noise Study at 2.

⁵ First Report and Order at paras. 183 (table), 224. For a derivation of these limits from the assumptions stated in text, *see* GPS Noise Report at 10 (table). A slightly different derivation appears in the First Report and Order at para. 107 (table 3).

⁶ Letter from Raul R. Rodriguez to Magalie R. Salas, Secretary, FCC, at Attachment, proposed rule Sec. XX.af(b) (filed July 16, 2001).

⁷ First Report and Order at para 224.

But Sprint Corporation thinks these levels are not low enough. Sprint's Petition for Reconsideration asks the Commission to reduce UWB limits in the GPS bands by another 8 dB to protect indoor E-911.⁸ XtremeSpectrum filed a timely opposition.⁹

The Commission's GPS Noise Report now provides conclusive evidence that Sprint's request for lower GPS-band limits is unnecessary, and will not contribute any additional protection to indoor E-911.

C. XTREME SPECTRUM SUPPORTS CONSERVATIVE MEASURES TO PROTECT SAFETY SERVICES.

XtremeSpectrum has consistently supported all reasonable measures needed to protect vital safety services. It is axiomatic that these take priority over non-safety-related UWB.

XtremeSpectrum's commitment to safety services has been evident since early in the proceeding. We filed shortly after release of the Notice of Proposed Rule Making to urge more conservative rules for the GPS bands.¹⁰ We also suggested restricting UWB operation to indoors, to protect sensitive outdoor services such as aviation systems¹¹ -- a proposal that ultimately evolved into lower limits for hand-held UWB equipment. And we unreservedly supported adoption of the U.S. GPS Industry Council's requested limits for the GPS bands.¹²

⁸ Sprint Petition for Reconsideration at 21-24 (filed June 17, 2002).

⁹ Opposition to Petitions for Reconsideration of XtremeSpectrum, Inc. (filed July 31, 2002) (XtremeSpectrum Opposition).

¹⁰ Reply Comments of XtremeSpectrum, Inc. at 4 (filed Oct. 27, 2000).

¹¹ *Id.* at 5.

¹² Letter from Mitchell Lazarus to Magalie Salas, Secretary, FCC (filed Sept. 10, 2001).

XtremeSpectrum continues to urge that the Commission leave the rules adopted in the First Report and Order unchanged. These offer more than adequate protection to vital safety services, even from ubiquitous UWB indoor and hand-held devices. The present rules for indoor and hand-held devices may be overly conservative, as the Commission suggests, but we support them nonetheless as affording an extra margin of safety.¹³

D. THE COMMISSION'S GPS NOISE REPORT CONFIRMS THAT UWB POSES NO HAZARD TO INDOOR E-911 OPERATION.

The only issue on reconsideration relating to UWB interference in the GPS bands is Sprint's concern about indoor E-911. Sprint wants the UWB emissions limits lowered by an additional 8 dB to account for four factors: the uncertainties in building attenuation (beyond the 9 dB the Commission has already allowed); a supposed cumulative effect of multiple UWB devices; the greater sensitivity required to acquire a satellite (as opposed to tracking one); and a smaller assumed distance between a PCS handset and a UWB device.¹⁴

Further reduction in the GPS bands is unwarranted. If any doubt remained on this point, the Commission's recent report on GPS-band noise would put it to rest. The report shows that UWB under the present rules cannot possibly have any effect on GPS reception in indoor E-911 applications.

¹³ The same considerations may not apply to imaging systems, which are used under controlled conditions in far fewer numbers. As noted above, XtremeSpectrum takes no position on such systems.

¹⁴ Sprint Petition at 22-24. We need not dispute each of these components individually, for the reasons given below. We do, however, note our repeated showing of no significant cumulative effect from multiple UWB devices. *See, e.g.*, XtremeSpectrum Opposition at 27-29 & attached Technical Statement at ix.

1. *Typical indoor ambient noise in the GPS bands far exceeds UWB limits.*

The Commission's report shows that ambient noise at GPS frequencies inside typical office and factory locations is typically 5-20 dB higher than the limits on indoor and hand-held UWB devices. The following table shows *median* measurements of multiple office and factory sites, expressed in dB above the UWB limits. The highest-measured site is shown in parentheses.

	GPS L1	GPS L2	GPS L5
Five Offices	10.5 (20.5)	13.5 (26.5)	23.5 (36.5)
Three Factories	12.5 (23.5)	11.5 (37.5)	10.2 (20.5)

Table 1
Indoor GPS-Band Emissions¹⁵
(dB above UWB limits)

Any UWB signal in an indoor environment will, quite literally, be lost in the noise.

2. *GPS-band emissions from common household and office devices far exceed those permitted from UWB devices.*

A second set of studies shows that typical devices widely found in homes and offices cause GPS-band emissions far higher than the levels permitted for indoor and hand-held UWBs. As above, this table shows the *median* measurements, expressed in dB above the UWB limits, with the highest-measured device in parentheses:

¹⁵ Source: GPS Noise Report at 25-26.

	GPS L1	GPS L2	GPS L5
Three Desktops	4.5 (14.5)	2.5 (8.5)	6.5 (7.5)
Four Laptops	4.0 (5.5)	7.5 (14.5)	10.0 (13.5)
One PDA	-0.5	8.5	6.5
One Pendant	27.5	(no data)	(no data)
Five Appliances	13.0 (17.5)	15.5 (30.5)	17.5 (34.5)

Table 2
GPS-Band Emissions from Common Devices¹⁶
(dB above UWB limits)

Again, other electrical or electronic devices in the vicinity are very likely to drown out indoor UWB emissions. Indoor E-911 is not a robust technology, and may not work as intended in every instance; but whether or not it works correctly on a given occasion will have nothing to do with UWB.

CONCLUSION

XtremeSpectrum has insisted throughout this proceeding that the UWB rules must protect safety services, including GPS and E-911. And we have maintained throughout the reconsideration phase that the First Report and Order accomplishes that goal. Sprint Corporation disagrees, as to indoor E-911. But release of the GPS Noise Report now provides conclusive evidence that UWB cannot affect GPS reception for indoor E-911. UWB operates tens of dB below indoor ambient noise levels in the GPS bands, and tens of dB below ordinary computers and home appliances. Permitted UWB emissions are not only safe in these environments, but in most cases will be completely undetectable.

¹⁶ Source: GPS Noise Report at 27-28.

The First Report and Order achieved a balanced result that meets the legitimate needs of both the nascent UWB industry and safety-of-life-spectrum users. The rules applicable to indoor and hand-held UWB devices should be affirmed without change.

Respectfully submitted,

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